

## REMARKS

Claims 1-7 and 9-28 are pending in the application. Claims 1, 13 and 20 are independent. By the foregoing Amendment, claim 8 has been canceled and claims 1-2, 5-7, 9-15, 18-21, and 24-28 have been amended. These changes are believed to introduce no new matter and their entry is respectfully requested.

### Objection to the Specification – No Summary

In the Office Action, the Examiner objected to the Specification. Specifically, the Examiner stated that a Summary of the Invention has not been included with the Specification. Applicant respectfully traverses the objection. Applicant would like to kindly point out that both the M.P.E.P. and 37 C.F.R. §1.73 do not require the presence of a “Summary of the Invention” in a patent application. They merely indicate where in the application the “Summary of the Invention” should be placed if Applicant were to elect to include one. In particular, 37 C.F.R. §1.73 only states that “[a] brief summary of the invention ... should precede the detailed description.” 37 CFR § 1.73 does not state “must” or “shall.” Accordingly, Applicant has elected not to include a “Summary of the Invention” as this is within the discretion of Applicant.

### Objection to Claim 19

In the Office Action, the Examiner objected to claim 19 citing informalities. By the foregoing Amendment, Applicants have amended claims 1 and 32 to accommodate the Examiner. Accordingly, Applicants respectfully request that the Examiner reconsider and remove the objection to claims 1 and 32.

### Rejection of Claims 1-28 Under 35 U.S.C. §103(a)

In the Office Action, the Examiner rejected claims 1-6, 8, 10, and 12-19 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,466,360 to Tokushima et al. (hereinafter “*Tokushima*”) in view of U.S. Patent Publication No. U.S. 2004/0213534 to Matsuura et al. (hereinafter “*Matsuura*”). The Examiner rejected claims 7 and 9 as being obvious over *Tokushima* in view of *Matsuura* in further view of U.S. Patent No. 6,891,985 to Delwala (hereinafter “*Delwala*”). The Examiner rejected claim 11 as being obvious over *Tokushima* in view of *Matsuura* as applied to claim 1 in further view of U.S. Patent No. 6,009,257 to Gunn, III

et al. (hereinafter “*Gunn*”). The Examiner rejected claims 20-28 as being obvious over *Tokushima* in view of *Matsuura* in further view of *Gunn*. Applicant respectfully traverses the rejection.

To establish a *prima facie* case of obviousness, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed. *KSR Int'l C. v. Teleflex, Inc.*, No 04-1350 (U.S. Apr. 30, 2007). The Examiner also must show that there is some expectation of success and that the cited reference teaches each and every element of the claimed invention. (MPEP §2143.) *citing In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

Representative claim 1 recites in pertinent part “a photonic crystal lattice in silicon semiconductor material, the silicon semiconductor material having a plurality of holes defined in the silicon semiconductor material, the plurality of holes periodically arranged in the silicon semiconductor material with a hole pitch and a hole radius to define the photonic crystal lattice; polysilicon semiconductor material regions disposed proximate to and insulated from respective inside surfaces of the plurality of holes defined in the silicon semiconductor material; charge modulated regions to be modulated in the polysilicon semiconductor material regions, wherein an optical beam directed through the photonic crystal lattice is modulated in response to a modulated effective photonic band gap of the photonic crystal lattice, the effective photonic band gap modulated in response to the charge modulated regions, wherein the effective photonic band gap of the photonic crystal lattice is modulated in response to a refractive index in the polysilicon semiconductor material that is modulated in response to the charge modulated regions.”

In the Office Action, the Examiner states that *Tokushima* discloses an apparatus comprising a photonic crystal lattice in first semiconductor material, the first semiconductor

material having a plurality of holes defined in the first semiconductor material, the plurality of holes periodically arranged in the first semiconductor material with a hole pitch and a hole radius to define the photonic crystal lattice; second semiconductor material regions disposed proximate to and insulated from respective inside surfaces of the plurality of holes defined in the first semiconductor material. The Examiner concedes that *Tokushima* fails to disclose charge modulated regions to be modulated in the second semiconductor material regions, wherein an optical beam directed through the photonic crystal lattice is modulated in response to a modulated effective photonic band gap of the photonic crystal lattice, the effective photonic band gap modulated in response to the charge modulated regions, but cites *Matsuura* for disclosing this element. The Examiner then combines *Tokushima* with *Matsuura* to arrive at the claimed invention. Applicant respectfully disagrees with the Examiner.

To establish a *prima facie* case of obviousness, an Examiner may not use an improper rationale for combining reference teachings. (MPEP §2145.) One such impermissible rationale is that if the proposed modification or combination of references would change the principle of operation of the references, then such combination or modification may not be used to render the claimed invention obvious. MPEP §2143.01 (citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)). Applicant respectfully submits that combining *Tokushima* and *Matsuura* would change the principle of operation of *Tokushima* and/or *Matsuura*.

*Tokushima* appears to be directed to a method of making a crystal. The crystal in *Tokushima* appears to have a GaAs substrate 11 and SiO<sub>2</sub> rods surrounding air 13. *Tokushima* does not disclose a method of operating its crystal. However, it can be assumed that the materials of fabrication, namely GaAs, will govern the operation. That is, *Tokushima* will likely be exploiting the high electron mobility of GaAs. *Matsuura* appears to be directed to a photonic crystal that changes its physical geometry. The crystal in *Matsuura* appears to operate using piezoelectric, magneto-restrictive, or electro-restrictive principles of operation. Thus, *Matsuura* is attempting to exploit the crystal's ability to change shape or to undergo mechanical deformation. Applicant respectfully submits that attempting to use piezoelectric, magneto-restrictive, or electro-restrictive principles of operation of *Matsuura* on the GaAs of *Tokushima* would change the principle of operation of *Tokushima*.

Alternatively, *Matsuura* provides no indication that the semiconductor properties found in of the GaAs in *Tokushima* are of any use for the piezoelectric, magneto-restrictive, or electro-restrictive operations in *Matsuura*. GaAs is not normally used for its ability to mechanically deform. Accordingly Applicant respectfully submits that the Examiner has improperly combined *Tokushima* with *Matsuura*. Accordingly, Applicant respectfully requests that the Examiner reconsider and remove the rejection to claims 1-28.

### CONCLUSION

Applicant submits that all grounds for rejection have been properly traversed, accommodated, or rendered moot and that the application is now in condition for allowance. The Examiner is invited to telephone the undersigned representative if the Examiner believes that an interview might be useful for any reason.

Respectfully submitted,

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Date: May 8, 2007

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#### CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below to the United States Patent and Trademark Office.

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5/8/07  
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